

# Meeting the Demand for Faster Order Fulfillment

## White Paper

*The use of automated, software-driven picking technologies such as horizontal carousels, vertical carousels and vertical lift modules for inventory picking can slash fulfillment times, labor needs, and warehouse footprint requirements, while vastly improving throughput and worker productivity. This supports same-day and next-day delivery objectives and boosts customer satisfaction.*



Throughout the retail, distribution and manufacturing sectors, competitive pressures are driving the demand for faster, more-accurate order fulfillment. Consumers everywhere are demanding faster access to the retail goods they purchase — with next-day delivery having practically become the norm, and same-day delivery and in-store pickup on the rise. Similarly, for many manufacturers and operators of industrial processes, demand is growing for near-real time access to replacement inventory and spare parts to ensure uninterrupted operation.

To meet this customer demand, a growing number of distributors and centralized inventory-management warehouses are seeking improved warehouse-management. The goal is to use a combination of automation technologies and improved workflow processes to reduce the time required to pick, pack and ship items. Such an approach can help warehouses and distribution facilities to overcome the many shortcomings that are associated with the traditional storage and retrieval paradigm — an inherently slow and inefficient approach that typically stores inventory in or on static shelving, drawer systems, pallet racks that hold both palletized loads and single items, and cartons, and relies on a manual picking and order-fulfillment process time-consuming.

The process of manually retrieving and consolidating highly individualized orders within any warehouse or centralized distribution center is extremely labor- and time-intensive, typically involving a legion of workers walking multiple laps throughout the facility (sometimes on multiple floors), for hours at a time. Such plant workers handpick items according to their unique “stock keeping units” or SKUs and then transporting each order to the shipping zone. Adding more workers only compounds the problem, since it’s been shown time and time again that overcrowding causes picking rates to fall, as logjams force workers to wait, and the increased head count inevitably invites socializing, further hindering productivity.

A variety of automation technologies are available to improve both the speed and accuracy of the picking process. When such dynamic storage systems are coupled with improved workflow procedures related to order-fulfillment, picking and shipping, facilities are able to drastically improve picking times and accuracy — often enabling next-day delivery with later daily cutoff times. This improves overall inventory management within the facility and boosts customer satisfaction.

## New Tools, New Strategies

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Today, advances in warehouse-automation technologies and the increased use of optimized picking and fulfillment design strategies are helping forward-thinking warehouses and distribution centers to make the most of both their floor space and their labor pool, and to improve their own performance capabilities, in order to meet the demands of their customers. Specifically, the use of automation efforts related to parts picking and order fulfillment can yield the following improvements:

**Improved Worker Productivity.** By bringing products right to the picking personnel, automated picking systems reduce the time and effort required for manual search-and-retrieve efforts, and thus significantly boost picking efficiency, worker productivity and overall throughput rate and volume at the facility. Specifically, the use of automation can increase picking rates by as much as 800% while reducing labor requirements. As a result, staff size can be reduced, or workers can be reassigned to other value-added operations, such as packing, shipping and quality checks to ensure accuracy.

**Improved Picking Accuracy.** In addition to improving turnaround time and enabling higher order-fulfillment volumes, today's software-driven automated picking systems can also improve picking accuracy (to above 99%). This speeds order fulfillment and allows for later order-cut-off times each day without compromising same-day and next-day delivery guarantees. Such service capabilities give customers greater control over their inventory-replenishment needs and increases customer satisfaction.

**Improved Space Utilization.** By maximizing the use of underutilized overhead space from the floor to the ceiling, today's dynamic storage and retrieval systems can reduce traditional floor space requirements by 65–85%. In many cases, this newfound floor space can be used to add inventory, or bring existing inventory that is currently stored offsite back under the same roof. In other cases, this new facility space can also be used to carry out other revenue-generating activities at the facility.

**Improved Working Conditions.** As noted, today's automated picking systems are designed with the worker in mind. Not only do they help to reduce arduous foot travel (and possible repetitive climbing of stairs) throughout the day, but the automated carousels that are at the heart of these improved systems feature an ergonomic design that presents the items to workers at waist height. This allows for easy picking and consolidation, while significantly reduces bending, reaching and carrying.

## Automaton Technology Options

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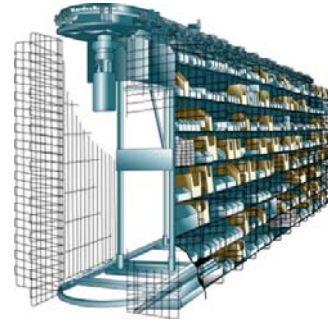
Today, a variety of automation technologies and optimization strategies are available to help warehouse operators overcome the limitations and inefficiencies of the manual approach. And because these technology options are essentially modular in nature, today's automated systems can be phased in over time. This gives warehouse managers great flexibility in terms of managing expenses and training issues, and analyzing ongoing results to both fine-tune ongoing optimization efforts and analyze return on investment (ROI).

In all cases, the potential opportunities for improvement can be identified by carrying out an analysis of the types of inventory stored at the facility, in terms of picking size (for instance, can the inventory be characterized as picked by piece, by case or by pallet?), and by pick frequency, also known as pick velocity or SKU movement (for instance, can the inventory be characterized as fast-, medium-, slow- or very-slow-moving?).

Most companies tend to focus their optimization efforts solely on the fastest-moving products in the facility. However, this approach is shortsighted, as this category of products typically comprises just a small fraction of the overall inventory. To fully exploit the potential benefits of automation, it is always worth considering applying these improvement techniques to some or all of the slow- and medium-moving SKUs, as well.

Today, three main technology options are available for automating the storage and retrieval of individual SKUs, to improve operational efficiency and increase fulfillment rates and throughput volume in warehouses and distribution centers: Horizontal carousels, vertical carousels and vertical lift modules (VLMs). Each is discussed below.

**Horizontal Carousels.** Horizontal carousels consist of bins and shelves that are mounted on a horizontal track. The track rotates to deliver individual items to a fixed ground-level location, where the picking operator retrieves them, consolidating batches of individual items to meet customer-specific orders. Today’s horizontal carousels range in size from small systems (which use a 16-foot-long oval track) to larger systems (which use a 120-foot-long oval track).



*Horizontal Carousel*



*Vertical Carousel*

**Vertical Carousels.** Vertical carousels take advantage of unused overhead space at the facility. They consist of a series of shelves or carriers that rotate along a track in the vertical axis, similar to a Ferris wheel. They bring stored items quickly to the worker at an ergonomically positioned level. Once reserved for light-duty storage (for smaller, lightweight parts), automated vertical carousels are now available to handle medium-duty and heavy-duty storage (with some systems able to hold more than 1,433 pounds per carrier).

**Vertical Lift Modules (VLMs).** The VLM also utilizes overhead space to minimize the unit’s footprint. VLMs operate like an elevator with a shaft in the middle and two columns of shelving or trays (in the front and back). An inserter and extractor mechanism in the center automatically locates and retrieves stored trays (with desired SKUs) from both columns and presents them to the operator at an easy-to-reach pick window. To maximize space, VLMs range in size up to 14.4 feet wide, 14.1 feet deep and 98 feet tall and can be fitted with temperature, humidity and cleanroom controls. Heavy-duty models can reach up to 65 feet tall and hold up to 2,200 pounds per tray.



*Vertical Lift Module*

*TABLE 1: Storage System Comparison Ranked by Their Benefits  
Rankings: 5=Best, 4= Great, 3=Better, 2= Good, 1=Fair*

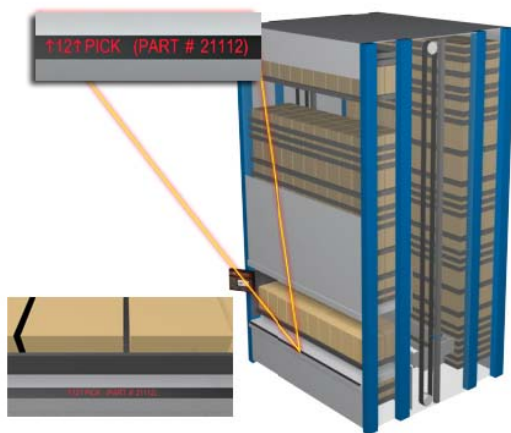
Benefits	Drawer Systems	Shelving	Pallet Rack	Pick Modules	Horizontal Carousel	Vertical Carousel	VLM
Space/Footprint	3	1	2	2	4	5	5
Throughput	1	1	3	2	5	3	4
Productivity	1	1	1	2	5	3	4
Accuracy	2	2	3	2	5	4	5
Inventory Control	3	1	3	3	3	4	4
Ergonomics	1	1	1	2	4	5	5
Expandability	5	5	5	4	4	3	4

## Getting The Most Out Of Automation

When seeking to automate the picking process in a warehouse or distribution center, selecting the right equipment is just one part of the solution. To get the most out of the investment, facility operators should also consider implementing complimentary technologies and improving work processes to improve the overall work flow within the facility and speed picking rates:

**Incorporate ‘Pick to Light’ Technology.** Each picking technology can be integrated with light-directed technology to increase picking speed and accuracy. Using “pick to light” technology, operators are directed to the exact cell to pick from within a given carousel or VLM. The pick light not only directs the operator to the pick location, but can also display the alpha numeric quantity to pick, a part number and description (Figure 1).

*FIGURE 1. The TIC (transaction information center) shown here uses an alphanumeric display to direct the operator to a location, indicating the quantity and part number to pick.*



## Customer Spotlight: Kubota Canada

### *Keeping 20-Years Of Spare Parts Available*

Producing tractors and utility vehicles for construction, commercial and residential use that are built to last, Kubota Canada Ltd. (Markham, Ont.) made a groundbreaking promise to its customers. The company vowed to not only keep replacement parts available for 20 years or more (in recognition of the long anticipated life span of the equipment) — but to put them in customers’ hands with next-day delivery speed. While that provides peace of mind for owners of Kubota’s products, it also creates a formidable storage and distribution challenge for the company.

The company’s legacy parts center in Markham, Ontario, not only stores legacy parts that cover a 20-year span of product introductions, but also adds ongoing spare-parts inventory as new models are introduced every year. The 60,000-square-foot facility already warehouses more than 78,000 SKUs — a number that continues to grow — and whether a given part is picked only once a year or every single day, rapid access to all inventories must be guaranteed to ensure quick turnaround for the customer.

In an effort to take best advantage of limited warehouse space and a manual system that created congestion and ergonomics challenges for workers, Kubota Canada implemented an automated picking system (purchasing and implementing the upgrades in phases). The modernized picking system now consists of:

- Six horizontal carousels for fast-moving SKUs
- Four VLMs for the medium-moving SKUs
- High-bay shelving for the slow-moving SKUs



*Caption: Part sales have grown steadily while labor requirements have only increased by 27%.*

The use of pick to light technology has been shown to sustain picking accuracy levels of 99.9%. This produces direct savings for the warehouse operator, not just improved overall throughput, but elimination of not only the time spent on the initial mistaken pick, but the added effort and time lag incurred to correct the mistake, as well.

**Arrange Picking Technologies In 'Pods'.** To maximize order-picking speeds, picking technologies are commonly arranged in pods, whereby two to four carousels or VLMs — equipped with pick to light systems and the necessary support software (discussed below) — are oriented around a centralized picking zone where the worker stands. This configuration allows the units to work in coordination and reduce worker wait time. As the worker is picking the first SKU required for the order, the other units are moving to pre-position the next SKU required. The units are in constant motion bringing items right to the worker's fingertips with little walk, search or dwell time (Figure 2).

*FIGURE 2. A worker is picking one order at a time from multiple units configured in a pod.*



*FIGURE 2A, four horizontal carousels are arranged in one pod with one operator picking from all four carousels.*



*FIGURE 2B, three VLMs are arranged in one pod with one operator picking from all three VLMs.*

## Kubota Canada (Continued)

**Horizontal Carousel Zone.** The six compact, horizontal carousels replaced a cumbersome 9,000 square foot mezzanine that occupied three stories (carried out in conjunction with a building relocation). Six new 24-foot-long horizontal carousels, the picking area and workstation — occupy just 2,600 square feet, representing a 71% reduction in floor space.

All picking operations are now carried out on the ground floor, eliminating the need for personnel to walk up and down stairs to fulfill orders. With less travel time, productivity has increased dramatically — from multiple workers each picking an average of 20 lines per hour, to a single worker picking an average of 225 lines/hour, while bagging and tagging — a 90% productivity increase.



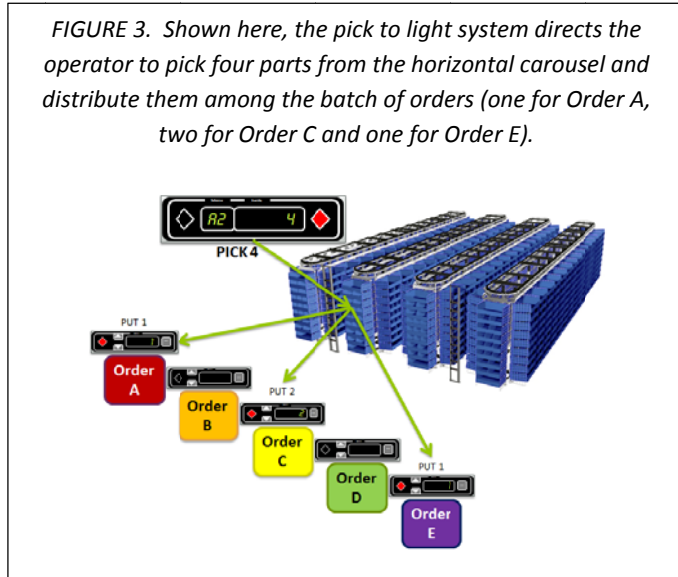
*Parts sales have grown by more than 70% over the past 12 years, yet labor requirements have only increased by 27%, thanks to the use of this compact, ergonomic, automated picking system.*

**VLM Zone.** Kubota installed four new VLMs in two phases; The first two units replaced 2,400-square feet of 18-foot high-bay shelving and later, two more units replaced 1,200 square feet of 24-foot high-bay shelving. The new picking area now occupies just 620 square feet, providing a 83% reduction in floor space — freeing up nearly 3,000 square feet to accommodate ongoing growth. Picking productivity has increased by 50%, and importantly, the company avoided a costly building expansion.

*To read more on Kubota Canada's experience, see <http://www.kardexremstar.com/us/storage-picking-optimisation/customer-references-us/kubota-canada.html>*

(detailed above), integrating pick to light technology (detailed above) and using inventory management software (detailed below) to group multiple orders into small batches (typically up to 16 orders). One operator picks all orders in the batch at the same time, working from a consolidated pick list. By taking advantage of programming logic in the software, this approach consolidates orders that require the same SKU into one pick, thereby saving time and speeding fulfillment rates. As directed by the pick lights, the operator retrieves a number of SKUs from the storage location and turns to the batch station to distribute the SKUs among the orders.

Each position on the batch station is also fitted with a “put” light. This displays the quantity to put into each order tote. When high accuracy is critical, the operator scans the SKUs before placing the items into the tote using a scanner mounted at each end of the batch station (Figure 3).



**Integrate Software.** Contemporary inventory-management software packages can fully automate the picking process, including receiving, picking and replenishing inventory. Often designed with a modular structure, inventory-management software can be easily tailored to meet the specific needs of a facility, and can be modified to keep up with facility changes over time.

Most inventory-management software provides seamless integration between the customer’s existing enterprise resource planning (ERP) systems and warehouse management systems (WMS). Full software integration allows organizations to track orders from placement through fulfillment and shipping, while managing inventory levels and data in real time.

When desired, a variety of other picking requirements can also be managed using inventory-management software, including FIFO (first in, first out) or LIFO (last in, first out) picking. Today’s software can also help operators to manage the inventory density within the storage unit and can be set to utilize fixed-location storage (whereby every SKU has a predetermined location) or random-location storage (whereby storage location dynamically changes based on the capacity of the unit).

Inventory management software also gives users access to a variety of data through standard and custom reports. For instance, if a given SKU has not been picked in six months, it can be flagged to potentially move off an automated carousel and reside on a manual shelf to improve efficiency. Reports related to minimum quantity levels can also be sent automatically to an order-management team when inventory levels fall to a pre-set threshold value, prompting reorder to ensure that the product is always on hand.

Meanwhile, to support increased picking speed, efficiency and accuracy — especially where accuracy is a mission-critical consideration, or where there are specific chain-of-custody issue requirements at play — barcode scanners can be mounted at each end of a batch station. As the items are picked, the system will require the bar codes to be scanned for verification and data capture before being placed in the customer’s order tote or bin. Such an improvement ensures nearly perfect picking accuracy.

## Strategies For Optimizing Material Flow

To maximize efficiencies, facilities must understand how parts move through the facility, and must match the most appropriate technology options to those patterns. Not all SKUs are the same, and they should not all be handled the same. For instance, SKUs should be separated into individual pick zones and each pick zone should incorporate the most appropriate technologies (described above) to maximize picking within that specific zone. Depending on the facility and the type of inventory handled within each zone, certain pick zones may be fully automated with pick to light technology and software (fast- and medium-moving SKUs), while others may still incorporate some manual shelving (slow-moving SKUs).

Discussed below are two commonly used strategies that should be considered when automating the picking process. Depending on the physical size, volume and nature of the inventory, any given facility may use one automated picking zone or twenty.

**The ‘Pick And Pass’ Strategy.** This approach breaks up the picking area into several sections or zones. Order pickers are assigned to a unique zone and only make picks of inventory located in that specific zone. Orders move through the respective zones, and are fulfilled using a “pick and pass” strategy. All orders start at the first zone and move through each zone collecting the parts required from each zone. Once the order has all required parts, it is routed to a quality check and forwarded to shipping. This allows the right technology mix to be used in each zone, to most efficiently pick the SKUs located there.

This approach is particularly useful in large operations that have a very high total number of SKUs and a high total

## Customer Spotlight: Value Drug Mart

### *Automation Benefits Community Pharmacies*

More than 20 years ago, in an effort to centralize its purchasing and distribution power, a consortium of thirteen community pharmacy owners established a central distribution center in Edmonton, Alberta. The goal was to exploit the economies of scale that added size in the marketplace could bring, in terms of pricing leverage and distribution efficiency. Today, the Value Drug Mart distribution center serves 32 member shareholder stores, plus 11 Apple Drug stores, 8 Rxellence Professional Dispensaries and roughly 300 affiliated stores throughout Alberta and British Columbia.

Today’s retail community pharmacies — in order to remain competitive with big chain pharmacies — are giving consumers more choices than ever before, in terms of the sheer number of consumer products and pharmacy items they carry. As a result, in recent years, the Value Drug Mart distribution center has increased its own inventory of products. Today, Value Drug Mart’s 60,000-square-foot warehouse manages 18,000 SKUs, which are spread over multiple picking zones.

Traditionally, the warehouse relied on pallet racks, flow racks, standard shelving and bulk-storage areas for inventory management, and employed a legion of workers to manually pick items needed to fulfill individual orders. However, to meet the growing demands for faster, more accurate fulfillment from its member pharmacies, Value Drug Mart recently installed six horizontal carousels (in two zones, with three carousels each) to replace two levels of static shelving. The new, automated system

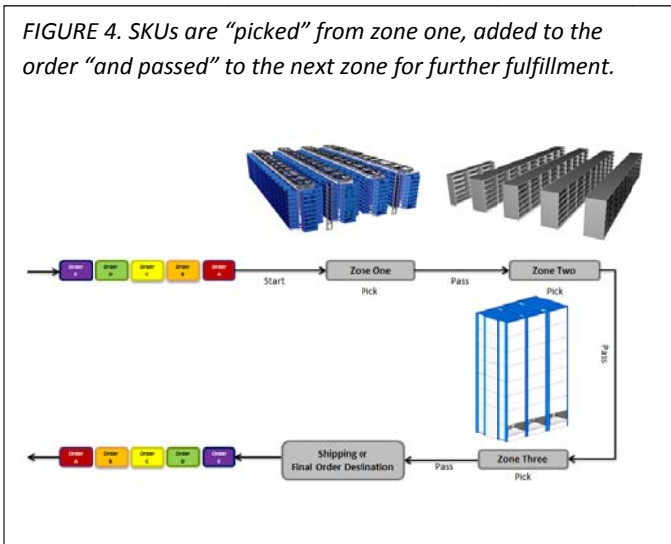


*Six horizontal carousels are stacked to create two zones of three carousels each.*



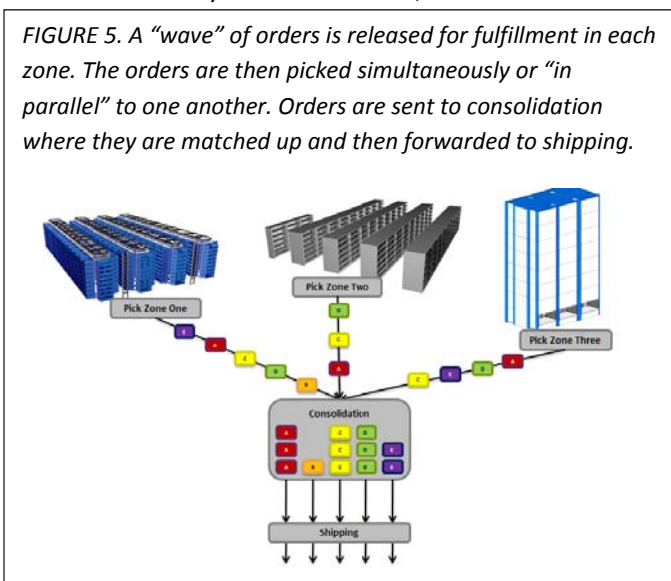
number of orders, yet a relatively low to moderate number of picks per order (Figure 4).

FIGURE 4. SKUs are “picked” from zone one, added to the order “and passed” to the next zone for further fulfillment.



**Wave Or Parallel Picking.** Similar to zone picking, in this approach, all zones are picked simultaneously and the items from each zone are later matched or consolidated to make orders complete (Figure 5). Similar to pick and pass, this strategy allows each zone to utilize the best mix of picking technology for the SKUs in that zone. This approach is particularly well suited for operations with a high total number of SKUs but a moderate to high number of picks per order. Wave picking provides warehouse operators with additional operating flexibility, as this approach may be used to isolate orders by different carriers, routes or zones.

FIGURE 5. A “wave” of orders is released for fulfillment in each zone. The orders are then picked simultaneously or “in parallel” to one another. Orders are sent to consolidation where they are matched up and then forwarded to shipping.



The beauty of today’s automation options for inventory picking and fulfillment is that they are inherently modular in

**Value Drug Mart (continued)**

uses pick to light technology, which provides fast, accurate guidance for workers during the picking process (this technology option is discussed in greater detail in the main text), and allows for 10 orders to be picked at a time, increasing overall picking productivity and order throughput at the facility.

The two new carousels hold more than 10,000 SKUs. The lower carousel manages 3,100 front-store SKUs, enabling an average pick rate of 350 lines/hour, while the upper carousel manages 7,100 pharmacy SKUs, enabling a pick rate of 575 lines/hour — an enormous improvement over the historic pick rate of 50 lines/hour from the static shelving.



“These measures help us maintain near perfect pick accuracy,” says Dwayne Bilawchuk, Operations Manager at the facility.

In the face of this dramatic increase in picking rate, this automation upgrade helped Value Drug Mart to reduce its labor requirements by 72%.

Meanwhile, the static shelving zones occupied 3,900 square feet on each of two levels. By comparison, the six horizontal carousels, stacked to create two zones, now occupy 1,625 square feet on each level, saving 2,275 square feet of floor space (an overall reduction of 58%). This recovered warehouse area is now used to store bulk goods, much of which was previously stored offsite.

To read more on Value Drug Mart’s experience, see <http://www.kardexremstar.com/us/storage-picking-optimisation/customer-references-us/value-drug-mart.html>

nature, so they can be implemented in phases. This allows warehouse operators to spread the investment costs over time, move certain parts of the overall inventory into these automated carousels, support workers as they gain experience with the new automated systems, and analyze the experience over time to determine time and labor savings and overall return on investment. That provides a win-win situation for all stakeholders.

To learn more about dynamic storage solutions that provide to faster order fulfillment contact your Kardex Remstar representative today.

## About Kardex Remstar

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Kardex Remstar, LLC, a company of the Kardex Group, is a leading provider of automated storage and retrieval systems for manufacturing, distribution, warehousing, offices and institutions. For information about the company's dynamic storage solutions, call 800-639-5805 or visit [www.KardexRemstar.com](http://www.KardexRemstar.com).